Importance Of Cone Beam Computed Tomography In Dental Implants: A Review

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ABSTRACT: -

In the past decade, usage of cone beam computed tomography is increasing in oral and maxillofacial surgery[1]. This helps in directing the surgeon in various approaches. It offers 3 dimensional and multiplanar views for accurate diagnosis and treatment planning without financial burden and radiation exposure as of by CT scans[2]. It overcomes the limitations of 2D imaging like magnification of superimposition, distortion and magnification. It has various applications in oral and maxillofacial surgery like in Trauma, TMJ, Implantology, Orthognathic surgery and pathology. However, it lacks to provide a detailed information on pathologic conditions, space infections and TMJ evaluation[2]. They are also useful in planning and placement of implants to replace missing teeth. Using CBCT, the data can be extracted and a template can be fabricated and plans in placing the implants[3]. They apply a method for applying CBCT data to place implants. Now, we shall discuss in detail, the role of CBCT in various fields of oral and maxillofacial surgery.

KEY WORDS: Cone Beam Computed Tomography[CBCT], oral surgery, trauma, implants.

INTRODUCTION:-

Since the introduction of cone beam computed tomography in oral and maxillofacial surgery ,has improved drastically the practice mode of oral surgeons[1]. Before its inception, panoramic radiography was the source of radiography. However, its use has been minimized or discontinued due to superimposition, magnification , distortion and suboptimal imaging of structures not located in the focal trough[1]. It provides 3 dimensional view and provides accurate diagnosis and treatment planning[2]. Smaller physical dimension, lower cost, easier operation have led to rapid acceptance of CBCT. Eventhough ,

MDCT and MRI is not obsolete in oral surgery, quality of CBCT is more.

DISCUSSION :-

Dentoalveolar surgery for impacted teeth is a common procedure in an office of OMFS. The inferior alveolar canal may follow a tortuous path , may not be interpreted on a 2D image. Plain films are not useful in revealing the ankylosis of the teeth. Knowledge of the location of the canal allows the surgeon to perform the procedure safely related to tooth and root elevation. Applying image shift principles is complicated and time consuming.

This can be eliminated by taking in CBCT scan[1].

It often provides significant diagnostic and treatment challenges. While assessing impacted canine, several factors should be assessed to determine the treatment plan and surgical approach inclusive of buccolingual width, root dilaceration, proximity or possible resorption of adjacent teeth.

By evaluating the cysts and benign tumors, intraoral and panoramic radiographs show 2 dimensional view of the lesion. Observation of the third dimension i.e. bucco-lingual view of lesion, requires additional radiograph at 90 degrees from the original view. Multiplanar sections are useful in examining cysts and tumors deep in the tissues[1]. Due to the superimposition of large tissue volume, it couldn't provide the information of internal structure of the lesion.

Treatment planning for patients with cleft lip and palate entails unique considerations[4]. Due to radiation exposure, it is not recommended to use in young children. CBCT should allow better evaluation of dental age, arch segment positioning and cleft size than the conventional radiography. Volumetric analysis provides the morphology of defect and volume necessary for the repair. CBCT provides a mean to investigate the tissues in depth.

CBCT scan is useful in determining how substantial the body of zygoma and what quantity of bone is available for placement of implants in orbital rim region and paranasal region. If, lingual perforation of mandible occurs unintentionally, it can be avoided if 3D imaging is used. Implant planning, surgical planning and fabrication and placement has been tested as 0.9 mm at crest of ridge and 1mm at apex on in an in vitro model[3]. CBCT scan and associated software have led to a rise in implant placement. A recent development of software , avoids the need of fabrication of radiographic guide. In a virtual model, the quality and volume assessment of the subjacent bone and virtual planning of positioning the implants[3].

A lesion that might have benign appearance on panoramic radiograph could leave ominous features in thin slices, while diagnosing malignant lesions. CT images can identify such irregular margins, providing information on early stages on malignant lesion[1]. CBCT is used due to low radiation dose and cost. When a malignant lesion is suspected involving osseous components, CBCT is recommended. CBCT tracks growth change, appreciate borders in depth perception and analyze approximation of adjacent vital structures. Benign lesions demonstrate poor diagnostic potential with CBCT[2].

One of the limitations in MDCT scans are the artefacts from metal restorations[1]. Bridgework and metal restorations make MDCT non diagnostic. CBCT is a best modality to view the metal objects in face like gunshot on face, surgical wires or broken dental needles.

CONCLUSION:-

In last decade, CBCT has became an important tool in oral and maxillofacial surgery. Its benefits can be felt by realizing the capacities and limitations. It is used to diagnose lesions in osseous structures. It would be benefitted to the clinicians if used judiciously with reduced cost and radiation dose[1]. Now research is going for CBCT to expand its usage. The main advantage in employing CBCT as a standard diagnostic tool for the placement of dental implant is in the mandibular posterior region,where the course of inferior dental canal runs from medial to lateral from 1st molar to 1st premolar region .In maxilla ,CBCT is the only tool which shows precisely the amount of bone in terms of height and buccopalatal width.Hence CBCT would become the gold standard diagnostic aid in future for placement of dental implant and would soon replace OPG in decision making in dental implants

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